





Discovery of the diving beetle *Laccornis oblongus* (Stephens, 1835) in Bavaria, southern Germany (Coleoptera, Dytiscidae, Hydroporinae, Laccornini)

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Abstract

The diving beetle *Laccornis oblongus* (Stephens, 1835) is recorded for the first time from Bavaria, southern Germany, which marks the most south-westerly record of the species known to date. Three specimens were collected in the Murnauer Moos nature reserve in Upper Bavaria. We summarize what is known about the species habitat in Germany and provide photographs of the sampling site and habitus, median lobe of aedeagus, and paramere of the species. We provide a checklist of the 20 other diving beetle species we found syntopic with *L. oblongus*.

Keywords

Aquatic Coleoptera, *Laccornis*, Murnauer Moos, new record, postglacial relict species

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Introduction

The Free State of Bavaria has a long tradition of aquatic beetle research. A comprehensive check list of Bavarian water beetles was published by Heckes et al. (2006), who included 120 species of diving beetles (Dytiscidae). During fieldwork for a research program to genetically characterize Bavarian key species, conducted by the Bavarian Natural History Collections (Staatliche Naturwissenschaftliche Sammlungen Bayerns, SNSB), we visited localities in the Bavarian Alps as well as peat bogs along their northern edge. This work includes the search for aquatic beetles of potentially high conservation priority. Here, we add the first Bavarian records for *Laccornis*

oblongus (Stephens, 1835), a characteristic and highly localized species. These are the most south-westerly records of the species known to date.

The Holarctic genus *Laccornis* Gozis, 1914 has eight species in the Nearctic region and two in the western Palearctic region (Miller and Bergsten 2016; Nilsson and Hájek 2021) and was last revised by Wolfe and Roughley (1990). *Laccornis oblongus* was classified as Holarctic, but its reporting from North America is only based on a single individual from northwestern Canada and a few unverified records from Alaska (Wolfe and Roughley 1990; Larson et al. 2000). However, this species is

probably more widespread in the Nearctic part of Beringia (Wolfe and Roughley 1990). The species is fairly widespread in northern Europe and frequent in fens in the Republic of Ireland as well as in Northern Ireland, United Kingdom, and from central Europe to eastern Russia (Nilsson and Holmen 1995). However, generally speaking, it is rather localized and not commonly collected. In Germany, *L. oblongus* is mostly distributed in the northern half of the country and is very rare, localized, or extinct in the western (e.g., Köhler 2012) and central parts (e.g., Spitzenberg 2021), and it is thought to be absent or even extinct in the southern parts (Köhler and Klausnitzer 1998). From Saxony only old records exist from the 1930 to 1950s (Zadlitzbruch and Wildenhainer Bruch in the Dübener Heath) (Fichtner 1983). The nearest stable population to the one in Bavaria is in southern Bohemia, 320 km north-east of Murnau (Boukal et al. 2007). The German Red List categorizes the species as Endangered (Spitzenberg et al. 2016).

Typical habitats of *L. oblongus* in Germany include shallow and temporary flooded areas of mesotrophic fens and tussock marshes, exposed or semi-shaded, often at the edge of, or surrounded by alder trees (*Alnus glutinosa* (L.) Gaertn.). The adults can be found in small mossy pools and overgrown peat cuttings or drainage ditches, very often with rich accumulations of detritus on the bottom (e.g., sedge detritus and layers of rotten leaves, mostly from alder) (Hendrich and Balke 1991; Hendrich 2003). While the species was also reported from kettle-hole-mines in north-eastern Germany, most occurrences are in flow-through fens and alluvial fens.

So far, the species has only been found in areas of ancient wetlands and habitats of natural origin (Hendrich 2003 and unpublished data). Foster et al. (2016) mentioned that flight tests have proved negative, but that the distribution of this species in England and Ireland indicates that specimens capable of flight must occur. In Germany, *L. oblongus* has never been collected outside its typical habitat, and there are no records from light traps.

The adults are thought to be able to dig deep into the substrate. In the case of hand collections, the species is therefore only collected where it occurs in greater abundance. More often than not, the species can only be detected with the help of smaller bottle traps, with or without bait, ideally between February and May (Hendrich 2003). *Laccornis oblongus* is an early spring breeder, and the larvae develop rapidly, passing through three instars, all of which have been recorded in Central Europe in June (Cuppen and Dettner 1987). Freshly emerged specimens of the new generation can be found from the end of May and will go on to overwinter (Cuppen and Dettner 1987; Hendrich 2003).

Methods

Collecting methods. Hand collecting was done using a kitchen strainer and heavy aquatic net. From 20–25 May 2021, 25 small funnel traps were deposited with an air

bubble and without bait, directly in the shallow water at the edge of potential habitats. The traps were built from 0.5 L water bottles and white plastic powder funnels with a very narrow funnel opening. The traps were checked on a daily basis. The male collected on 17.IX.2011 was captured by sorting out a large volume of peat extracted from a ditch using a conventional hand net (GB-nets/NHBS).

Photos and illustrations. Images were taken with a Canon EOS R camera fitted with the MPE 65 macro lens, attached to a Stackmaster macro rail (Stonemaster: <https://www.stonemaster-onlineshop.de/>). Illumination was with three LED segments SN-1 from Stonemaster. Images of the median lobe of aedeagus and paramere were made with an Olympus BX61 microscope using a Q-imaging Camera (15.2 64 Mp Shifting Pixel, Diagnostic Instruments Inc.) with Image Pro Plus (Media Cybernetics, Bethesda, MD, USA, <http://www.mediacy.com/imageproplus>). Images taken on different focal planes were then stacked with Helicon Focus 4.77TM software.

Georeferencing. The geographic position data were extracted from Google Earth (<http://earth.google.com>) and are given in decimal degrees. Our map is based on Bleich, Gürlich and Köhler: Verzeichnis und Verbreitungsatlas der Käfer Deutschlands (<http://www.coleokat.de/>, accessed on 2021-11-3).

Codens.

CMM Collection Michael Manuel, Sorbonne Université, Institut de Systématique, Evolution, Biodiversité, Paris, France

ZSM Zoologische Staatssammlung München, Munich, Germany

Results

Laccornis oblongus (Stephens, 1835)

Figures 1, 2

Hydroporus oblongus Stephens 1835: 437 (original description).

Laccornis oblongus (Stephens, 1835): Gozis 1914: 111 (new combination); Nilsson and Holmen 1995: 25 (redescription); Nilsson and Hájek 2021: 213 (World catalogue).

New records. GERMANY – Bavaria • Murnau, Murnauer Moos; 47°37'59"N, 011°09'59"E; 630 m alt.; 17.IX.2011; Alié and Manuel leg; 1 ♂, E0437-CMM, CMM • Murnau, Murnauer Moos; 47°37'60"N, 011°09'57"E; 630 m alt.; 20.V.2021; Balke and Hendrich leg.; 1 ♂, 1 ♀, LH1/21ZSM, ZSM.

Distribution in Germany. The distribution of the species in Germany is shown in Figure 3. The red dot marks the new records for Bavaria.

Habitat. The first specimen was collected in a puddle in a former drainage ditch which was about 3 m long and 1.5 m wide and had a maximum depth of about 50 cm. It was in a shaded situation under smaller alder and willow trees, with taller conifers. There was no aquatic

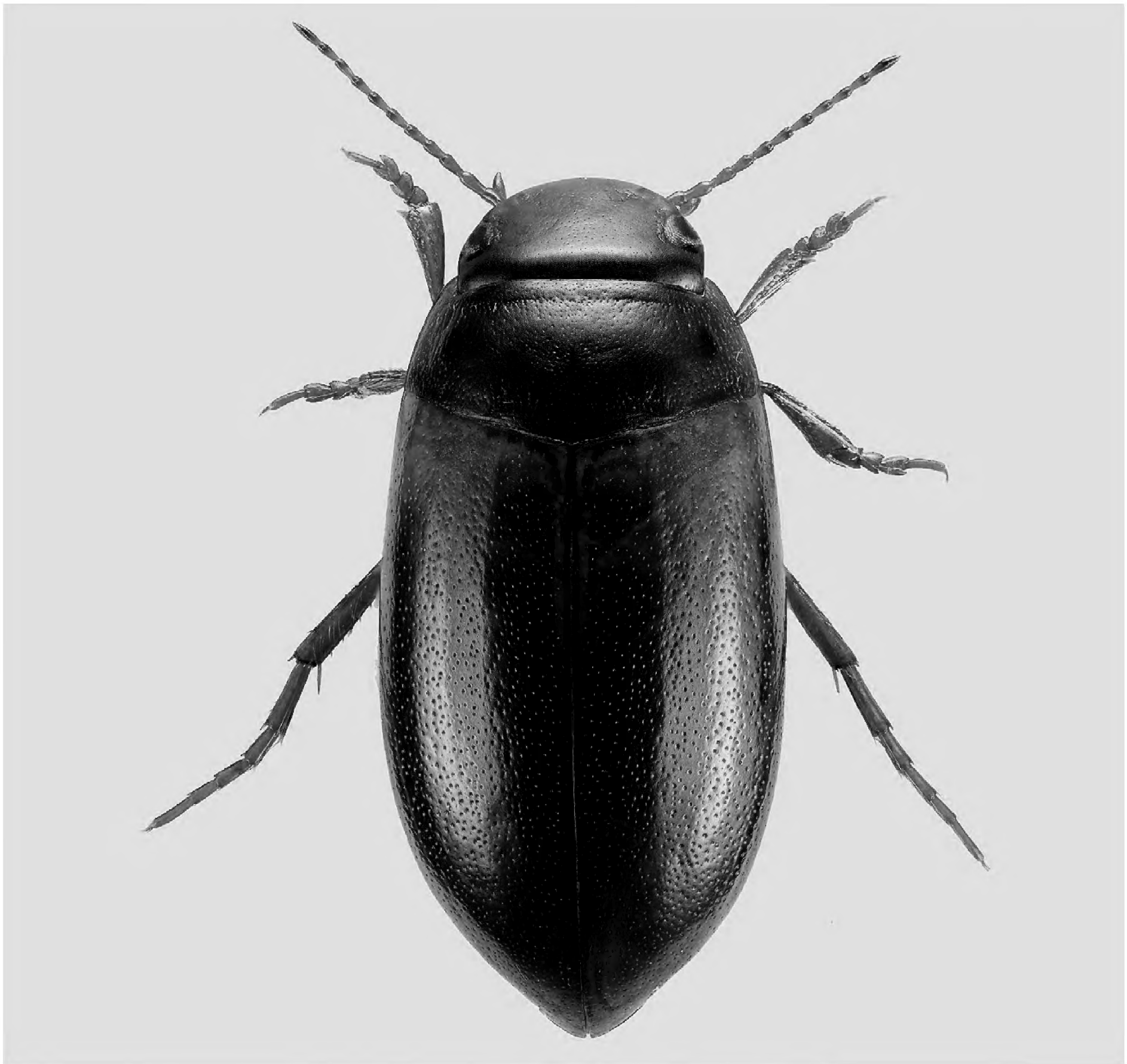


Figure 1. Habitus of *Laccornis oblongus* from Murnauer Moos in Bavaria, total length of body = 4.8 mm.



Figure 2. Median lobe (lateral and ventral view) and paramere (lateral view) of *Laccornis oblongus* from Murnauer Moos in Bavaria. Scale bar = 500 µm.

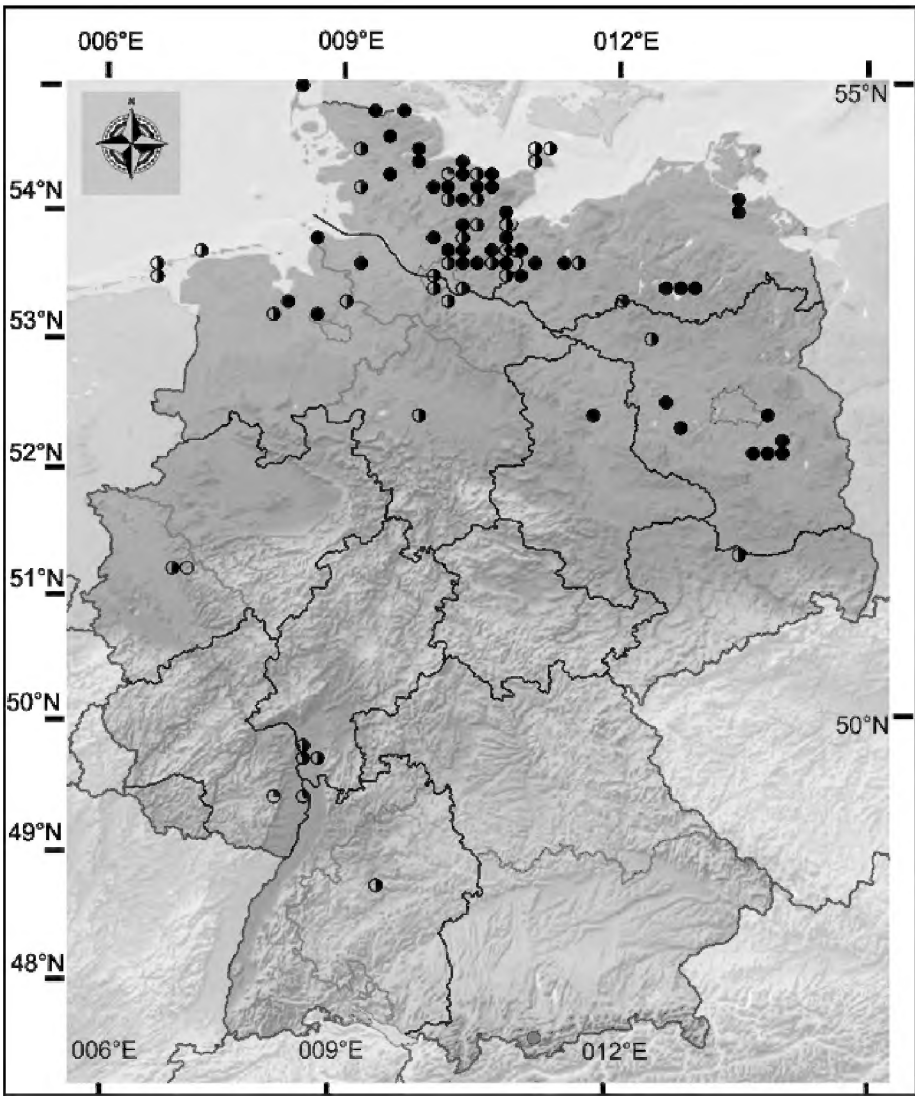


Figure 3. Distribution of *L. oblongus* in Germany. Black dots = records after 2000, half-filled black dots = records 1950–2000, black dots filled to a quarter = records 1900–1950, red dot = new record. This map is based on Bleich, Gürlich and Köhler: Verzeichnis und Verbreitungsatlas der Käfer Deutschlands (<http://www.coleokat.de/>; accessed on: 2021-11-3).

vegetation, and even the *Carex* sp. tufts surrounding that part of the ditch were entirely out from the water at that time. The ditch was filled with a great quantity of peat, decaying leaves, and other incompletely degraded vegetal material. The habitat sampled in May 2021 was only 50 m away but south of the main trail and more open and sun exposed. At that time of the year the whole ditch was full of water, without any aquatic vegetation but partly overgrown with mosses, and the *Carex* sp. tufts were all flooded (Fig. 4). The water was black, and the bottom was covered with decaying leaves and other incompletely degraded vegetal material (Fig. 5). At both spots in the Murnauer Moos we found a rich dytiscid fauna. Altogether, 21 species have been collected, including acidophilic species (Hebauer 1994) such as *Acilius canaliculatus* (Nicolai, 1822) (first record for Murnauer Moos), *Ilybius guttiger* (Gyllenhal, 1808), *Hydroporus neglectus* Schaum, 1845, and *Nartus grapii* (Gyllenhal, 1808) (Table 1). All four are classified as Endangered on the Red List of Bavaria’s water beetles (Hebauer et al. 2003). The presence of *L. oblongus* always indicates occurrence of other conservation-relevant diving beetles (Hendrich 2003).

Identification. The three specimens of *Laccornis* from Murnauer Moos clearly belong to *L. oblongus* based on the characteristic elongate oval habitus and chestnut brown coloration (Fig. 1) and from examination of the median lobe and paramere (Fig. 2) (see also Nilsson and Holmen 1995). Furthermore, the Bavarian beetles were



Figure 4. Habitat of *L. oblongus*. Installation of special small traps for collecting smaller diving beetles in the Murnauer Moos nature reserve, north of the Schwarzsee. Partly shaded, shallow ditch with sedge bulbs (*Carex* ssp.) and *Sphagnum* mosses, along the main trail, with high water level, 20 May 2021.

Table 1. Diving beetles found syntopically with *Laccornis oblongus* in the Murnauer Moos, southern Bavaria, with number of specimens collected for each species.

Species	2011	2021
<i>Acilius canaliculatus</i> (Nicolai, 1822)	0	15
<i>Acilius sulcatus</i> (Linnaeus, 1758)	0	1
<i>Agabus affinis</i> (Paykull, 1798)	0	12
<i>Agabus bipustulatus</i> (Linnaeus, 1767)	0	5
<i>Agabus melanarius</i> Aubé, 1837	1	20
<i>Agabus sturmii</i> (Gyllenhal, 1808)	0	8
<i>Hydaticus seminiger</i> (De Geer, 1774)	1	36
<i>Hydroporus angustatus</i> Sturm, 1835	13	26
<i>Hydroporus incognitus</i> Sharp, 1869	44	85
<i>Hydroporus melanarius</i> Sturm, 1835	0	3
<i>Hydroporus memnonius</i> Nicolai, 1822	2	6
<i>Hydroporus neglectus</i> Schaum, 1845	0	2
<i>Hydroporus palustris</i> (Linnaeus, 1761)	3	33
<i>Hydroporus striola</i> (Gyllenhal, 1826)	0	60
<i>Hydroporus tristis</i> (Paykull, 1798)	0	1
<i>Ilybius ater</i> (De Geer, 1774)	0	7
<i>Ilybius guttiger</i> (Gyllenhal, 1808)	0	21
<i>Ilybius quadriguttatus</i> (Lacordaire, 1835)	0	3
<i>Laccornis oblongus</i> (Stephens, 1835)	1	2
<i>Liopterus haemorrhoidalis</i> (Fabricius, 1787)	0	1
<i>Nartus grapii</i> (Gyllenhal, 1808)	1	52
21 species	66	394



Figure 5. A. Habitat of *L. oblongus*. One week after the collection date, this part of the ditch was almost dry. **B.** Details of the habitat of *Laccornis* in the Murnauer Moos. In 2021 both beetles were collected at the edge of the ditch among rotten leaves and decaying *Carex*, alder, and willow leaves.

matched with specimens from north-eastern Germany (Berlin, Brandenburg and Mecklenburg-Vorpommern) deposited in ZSM and in the collection of the first author.

Discussion

In Murnauer Moos, the population density of *L. oblongus* seems to be lower than at many localities of northeast Germany (Hendrich and Balke 1991; Hendrich 2003). Although we used intensive trapping and hand netting, we have only found three individuals so far. The rarity and the local occurrence of *L. oblongus* in the Murnauer Moos can also be deduced from the fact that the water beetle fauna of Murnauer Moos was already intensively investigated by Burmeister (1982). He listed 45 species of diving beetles for the area. With the newly recorded *L. oblongus* and *A. canaliculatus*, this number rises to 47. Altogether 121 species of Dytiscidae are currently known from Bavaria.

It cannot be ruled out that there are still locations in the Murnauer Moos in which the species can be found somewhat more frequently. The fact that all observations were made outside the phenological optimum of the species (end of February to early May) must also be considered. Only further studies will show how widespread the postglacial relic species *L. oblongus* is in the Murnauer Moos or perhaps in other peatland conservation areas in Upper Bavaria.

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Authors' Contributions

Funding acquisition: MB. Visualization: MB, LH, MM. Writing – original draft: LH, MB. Writing – review and editing: LH, MB, MM.

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